ROKAF » Artwork

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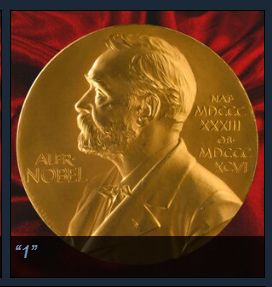

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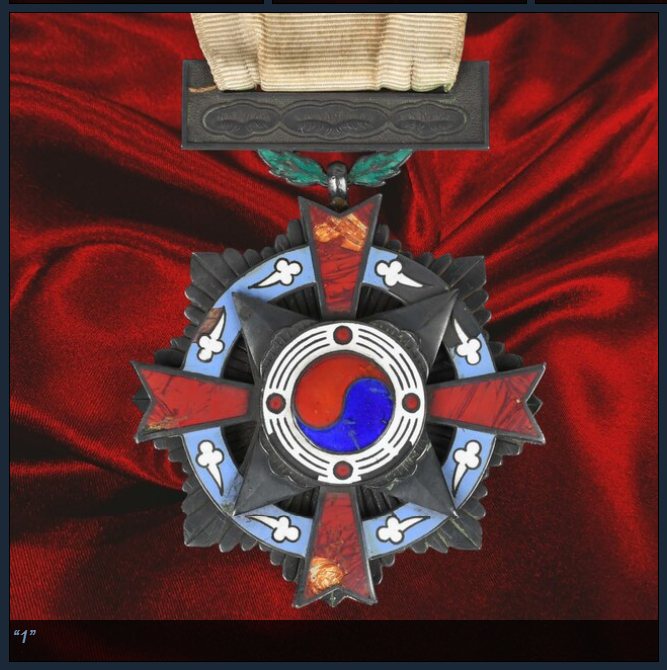
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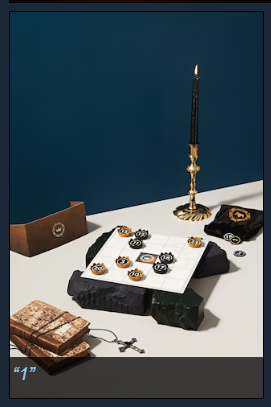
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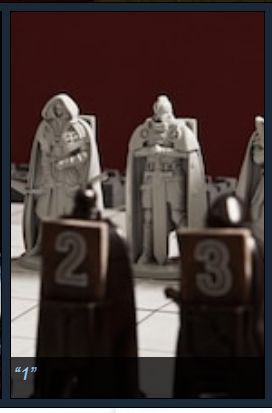
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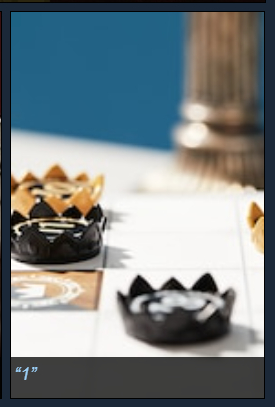
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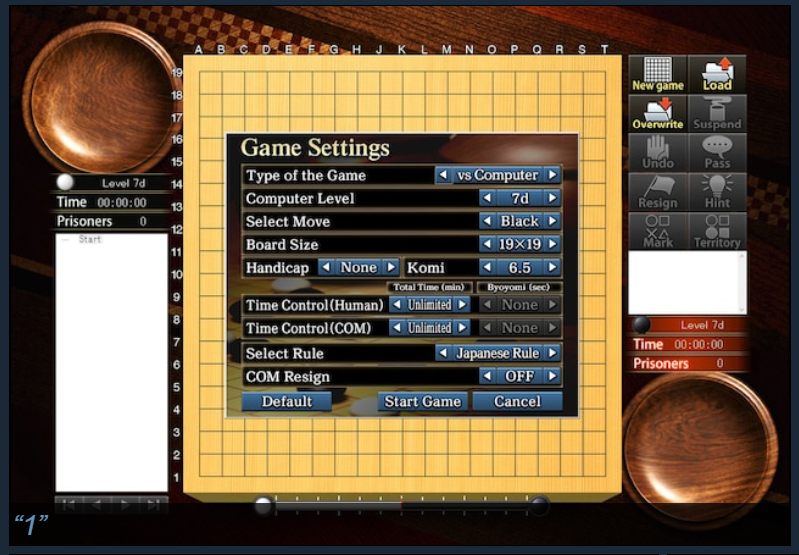
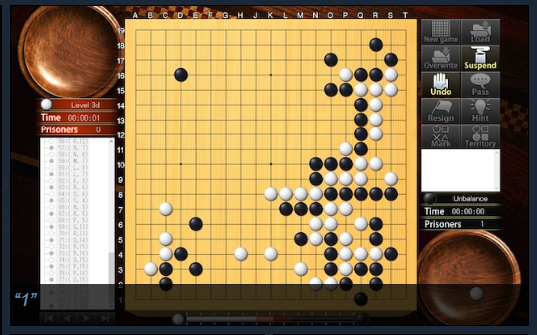
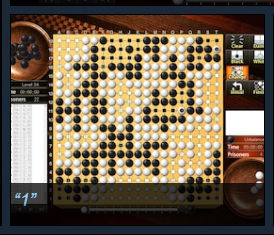
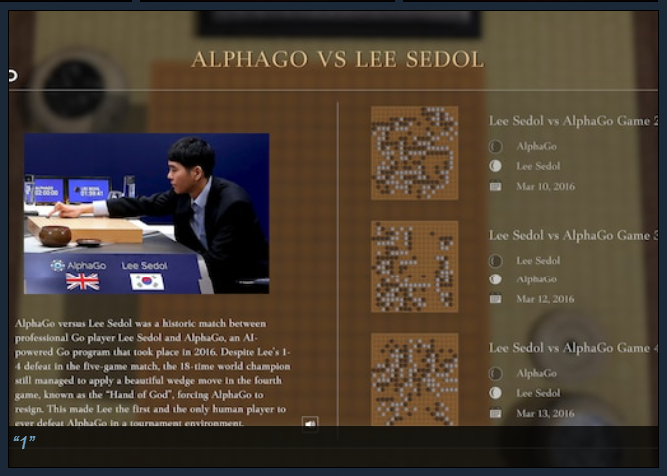
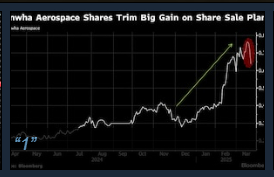

Game Settings
Type of the Game
vs Computer
Computer Level
7d
Select Move
Black
Board Size
19×19
Handicap
None
Komi
6.5
Total Time (min)
Byoyomi (sec)
Time Control (Human)
Unlimited
None
Time Control (COM)
Unlimited
None
Select Rule
Japanese Rule
COM Resign
OFF
Default
Start Game
Cancel
New game
Load
Overwrite
Suspend
Undo
Pass
Resign
Hint
Mark
Territory
Level 7d
Time 00:00:00
Prisoners 0






ALPHAGO VS LEE SEDOL
AlphaGo
Lee Sedol
Lee Sedol vs AlphaGo Game 2
AlphaGo
Lee Sedol
Mar 10, 2016
Lee Sedol vs AlphaGo Game 3
Lee Sedol
AlphaGo
Mar 12, 2016
Lee Sedol vs AlphaGo Game 4
AlphaGo
Lee Sedol
Mar 13, 2016
AlphaGo versus Lee Sedol was a historic match between professional Go player Lee Sedol and AlphaGo, an AI-powered Go program that took place in 2016. Despite Lee's 1-4 defeat in the five-game match, the 18-time world champion still managed to apply a beautiful wedge move in the fourth game, known as the "Hand of God", forcing AlphaGo to resign. This made Lee the first and the only human player to ever defeat AlphaGo in a tournament environment.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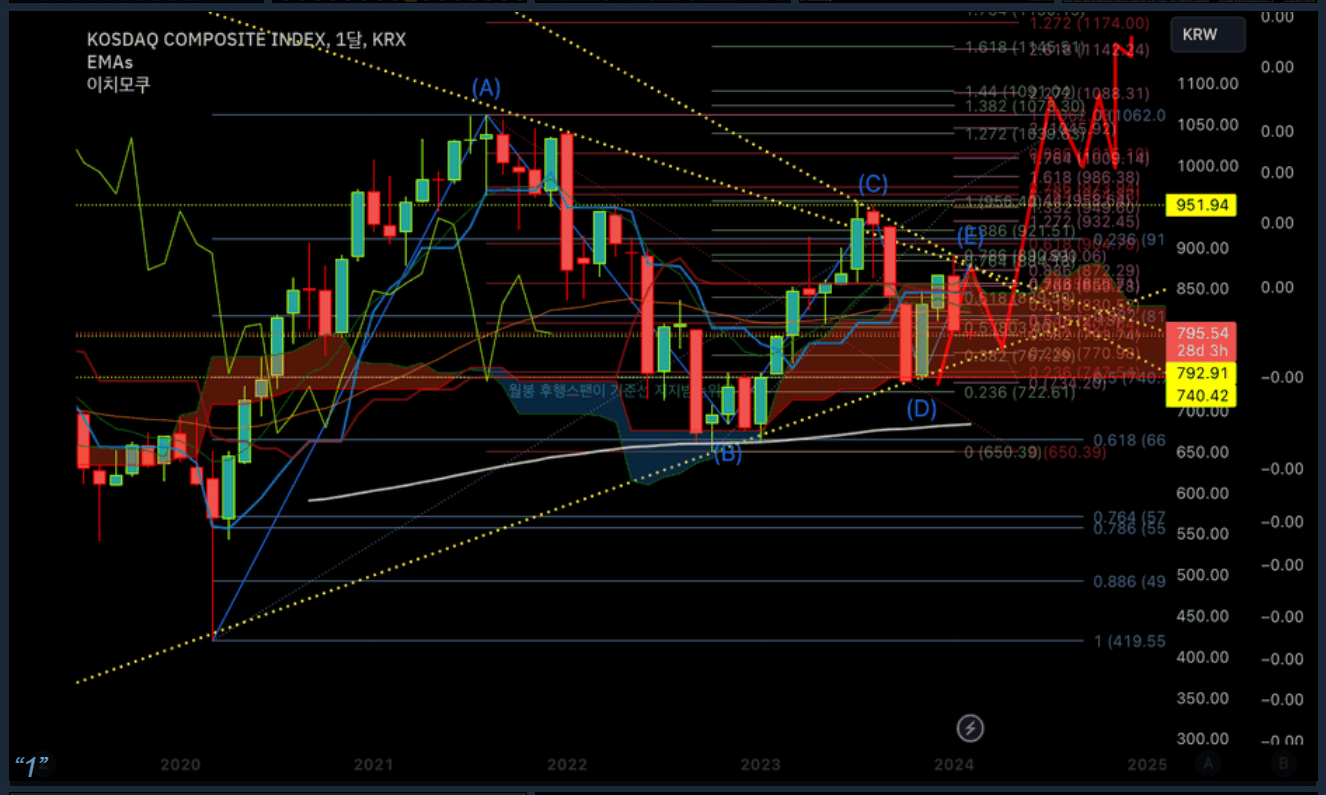
TOUGH TIMES: PASSIVE TECH ETFs
BIDASK


KOSDAQ COMPOSITE INDEX, 1달, KRX
EMAs
이치모쿠
(A)
(B)
(C)
(D)
(E)
KRW
951.94
795.54
28d 3h
792.91
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2020
2021
2022
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2024
2025

−1,203.27 (−19.11%) −120,327

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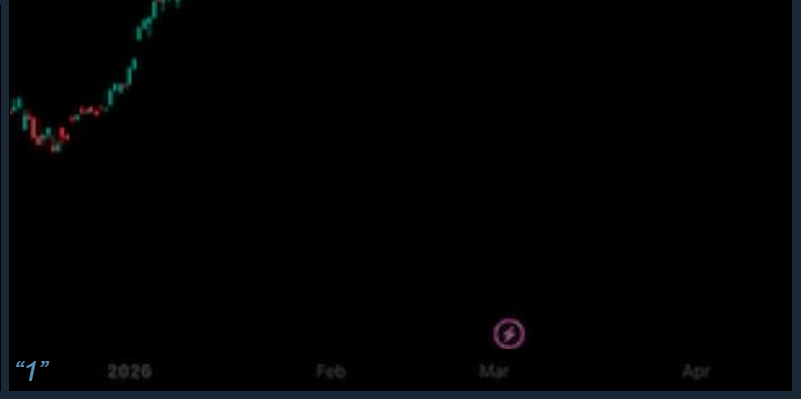
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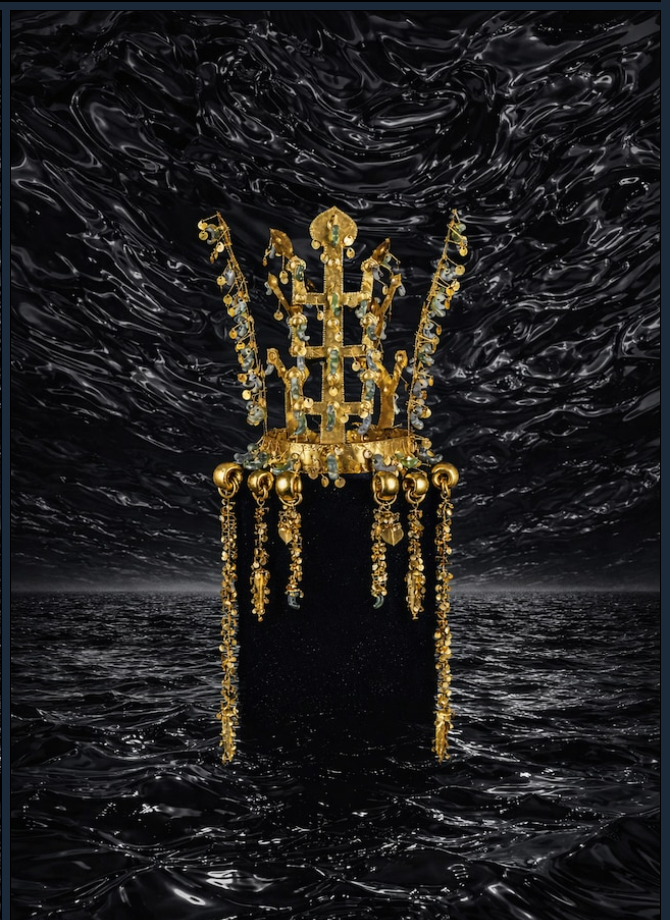
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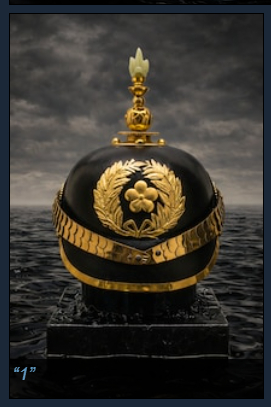
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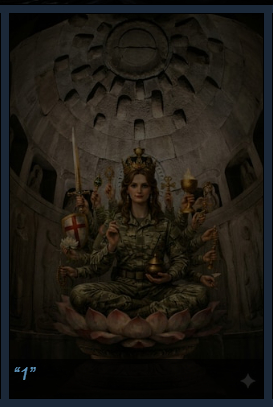
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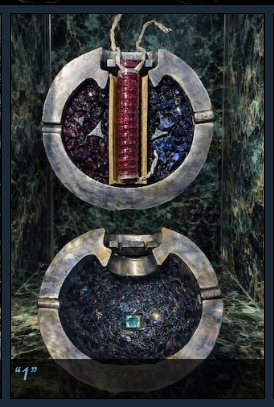
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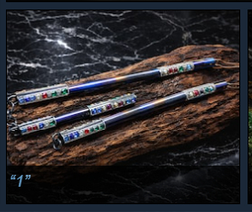
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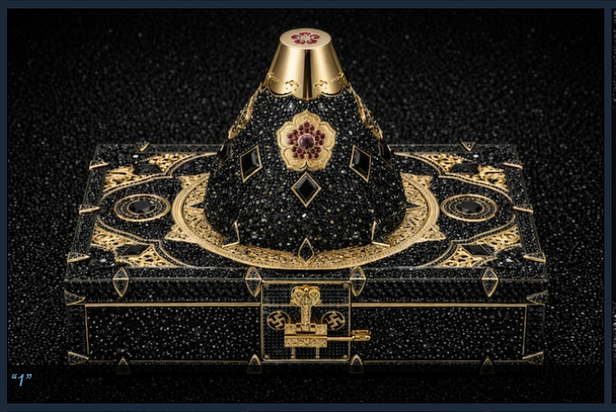
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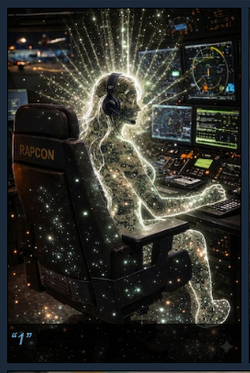

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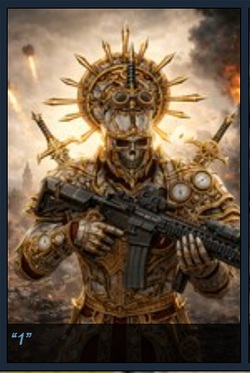
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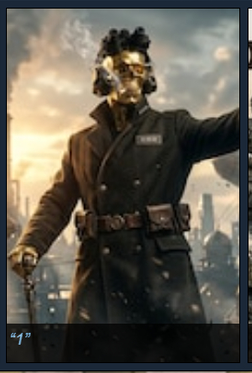
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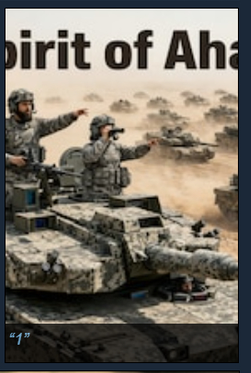

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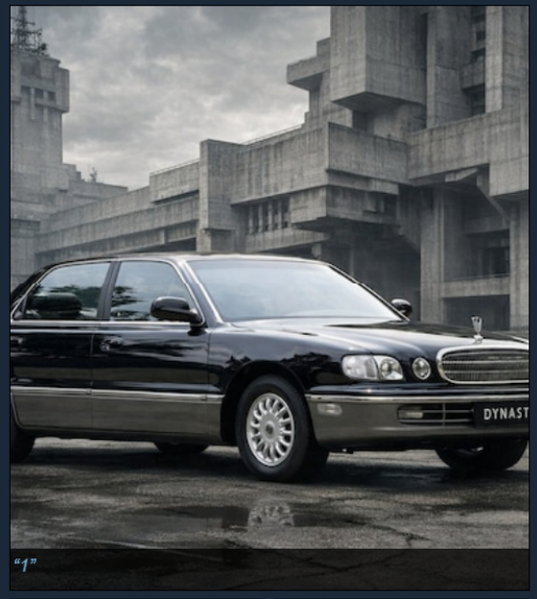

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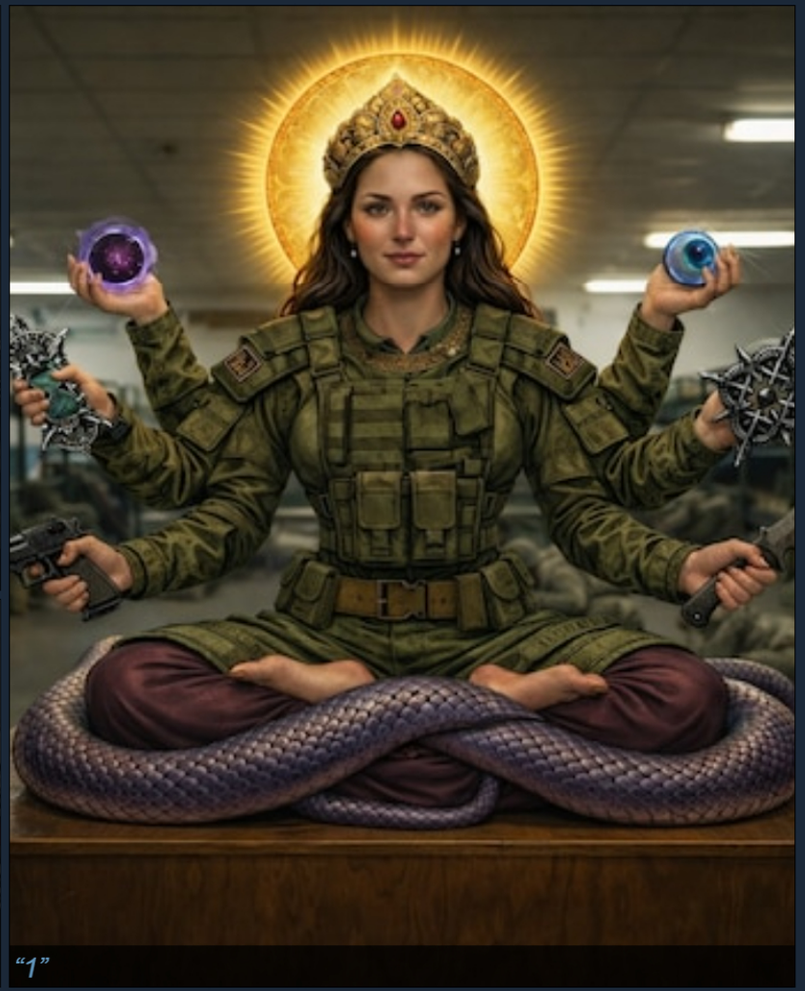

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“아트워크 제목 만들기”

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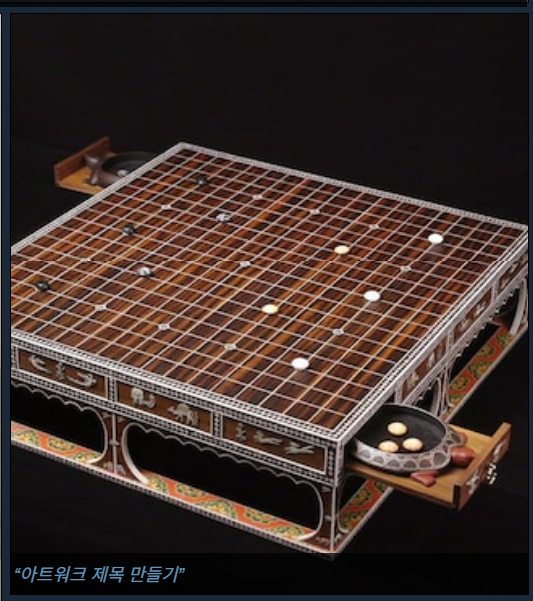
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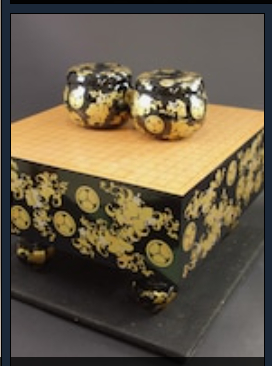
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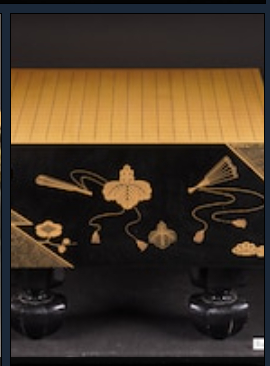
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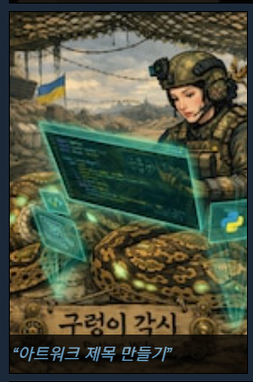

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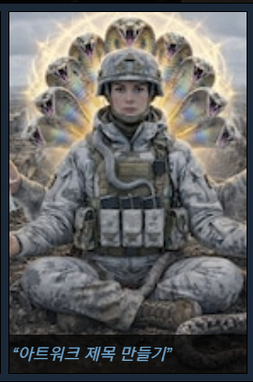

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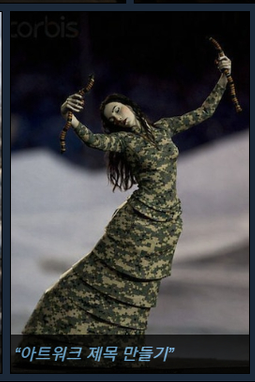

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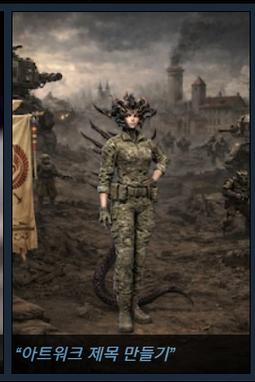

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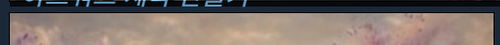

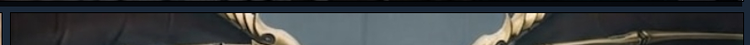

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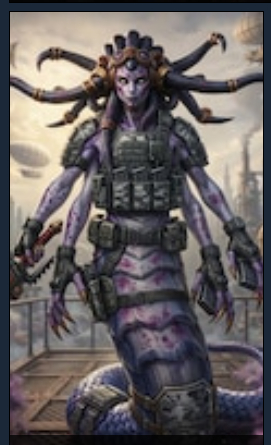

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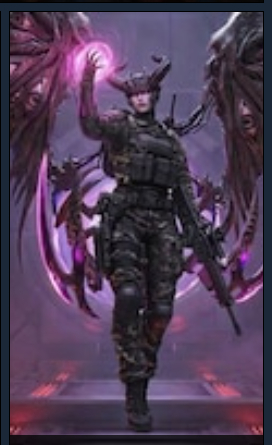

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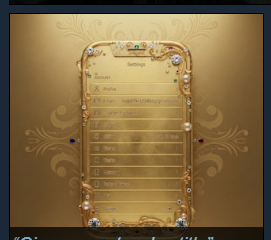

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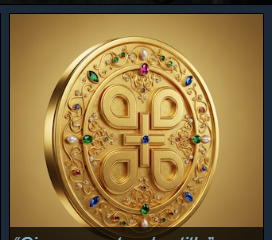

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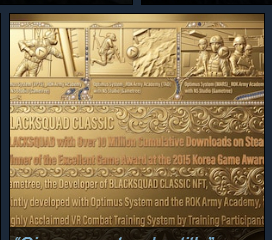

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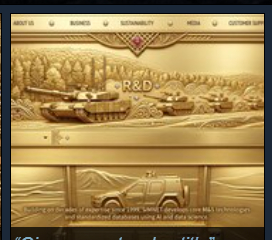

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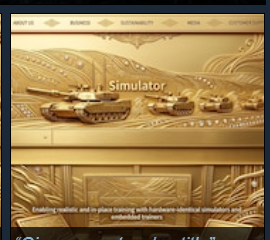

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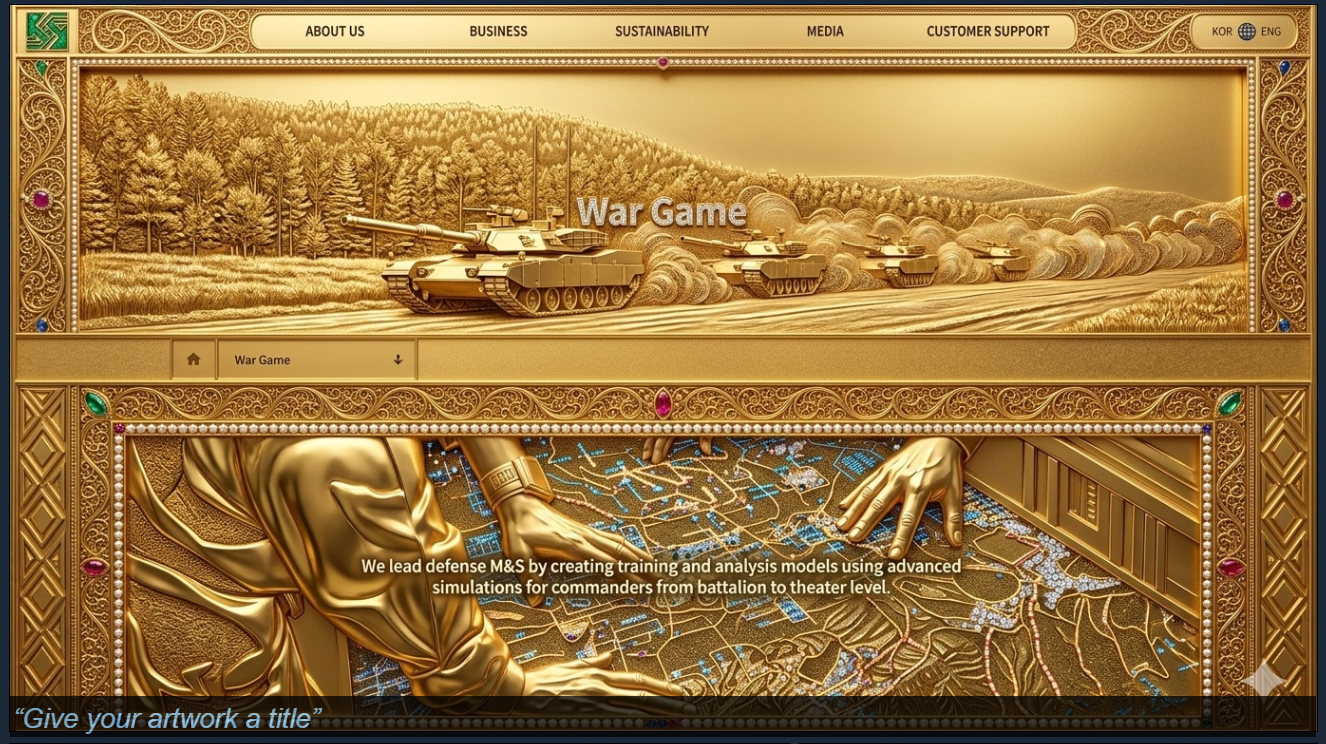

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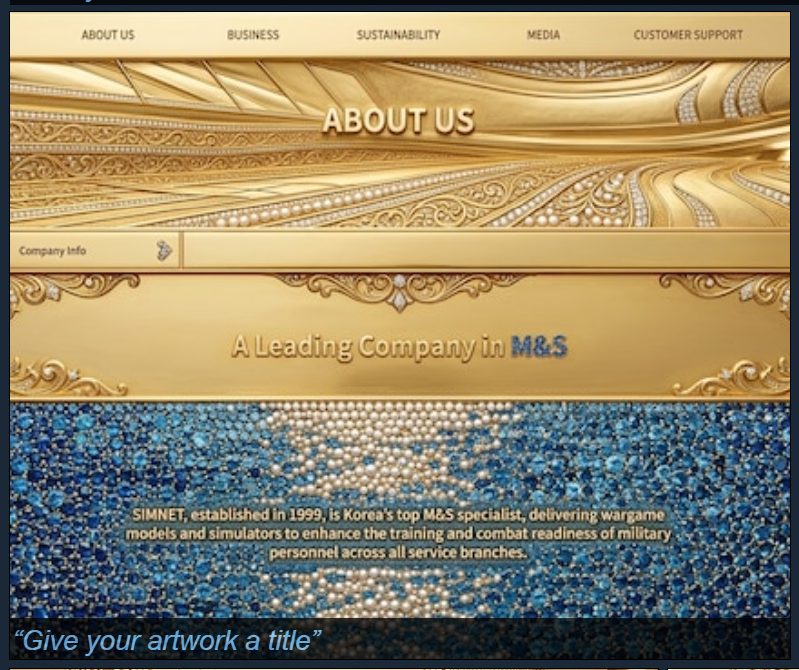

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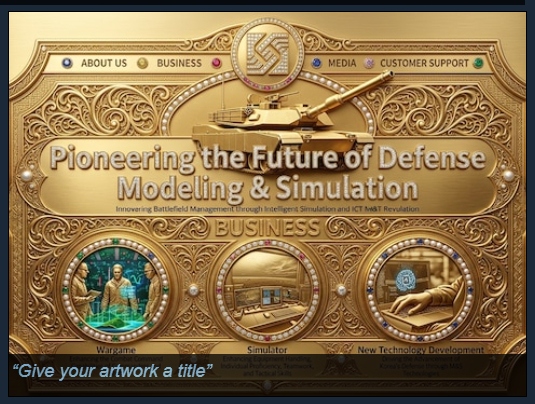

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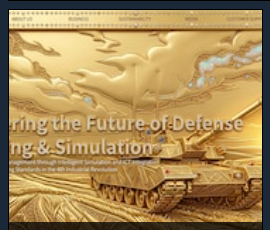

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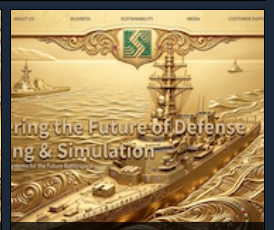

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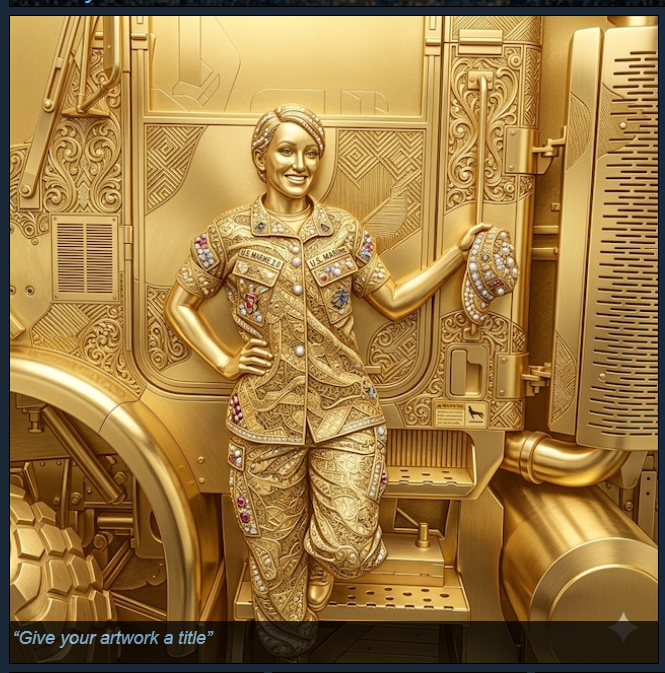
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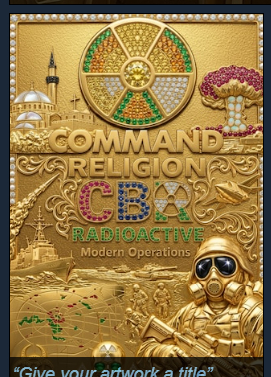

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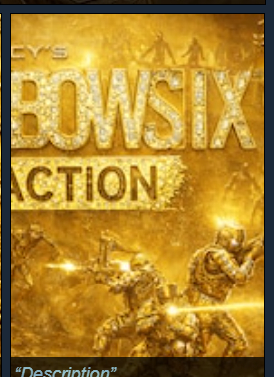

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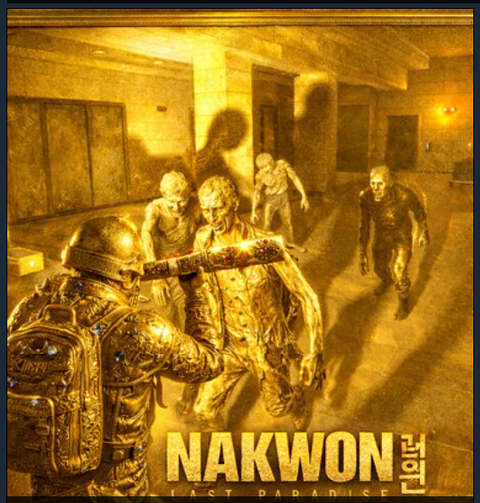

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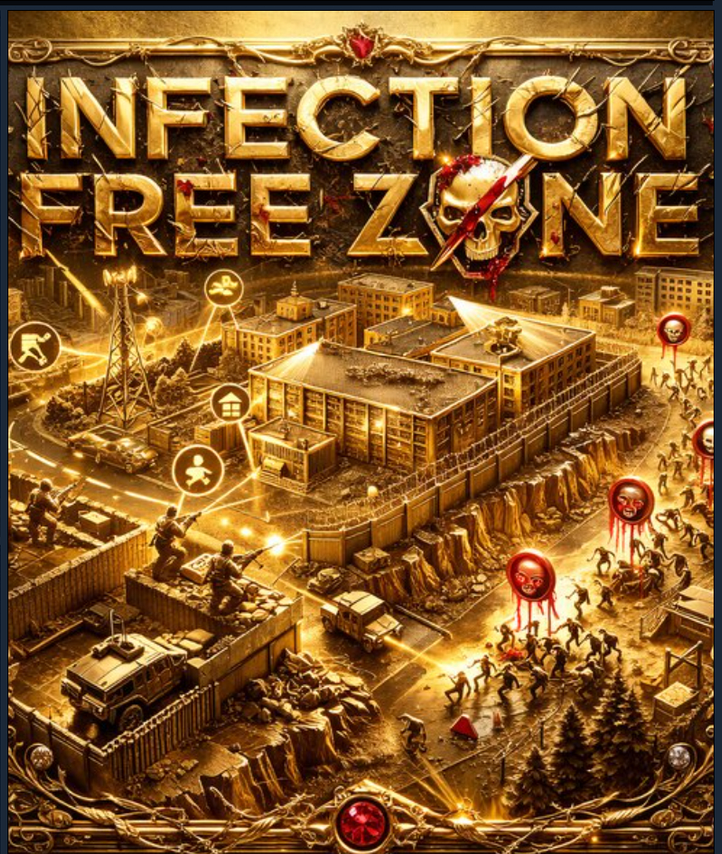

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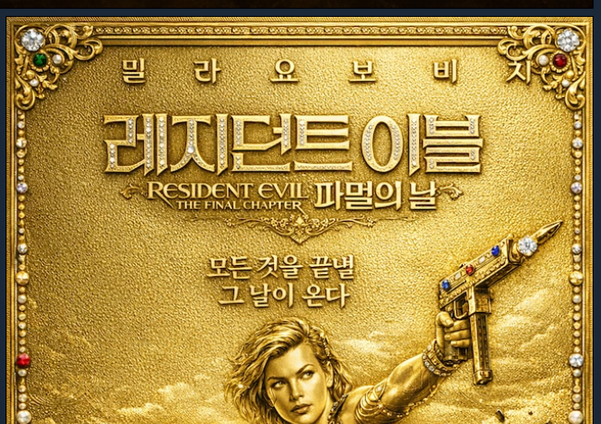

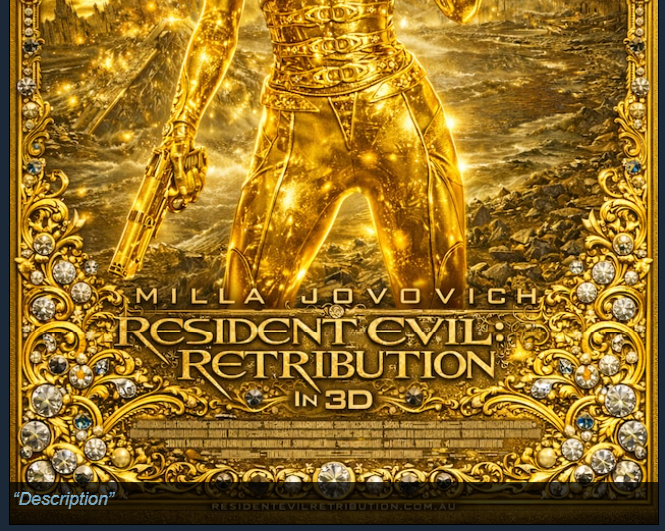

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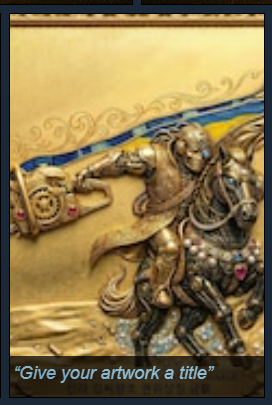

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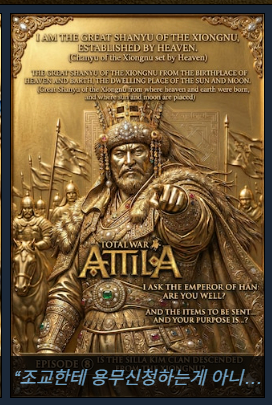

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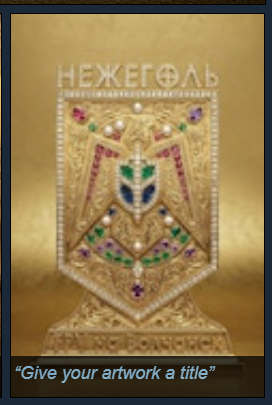

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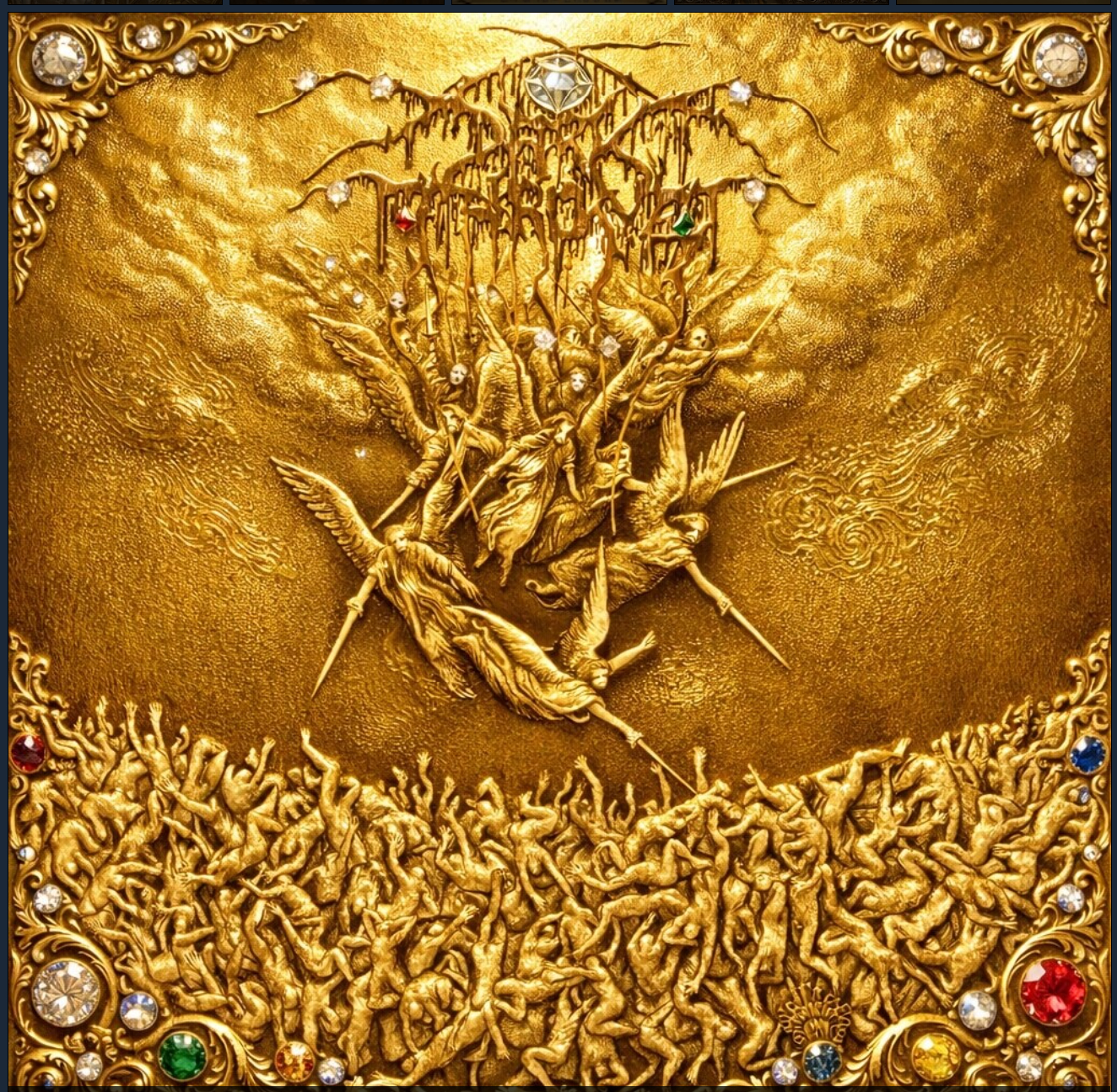

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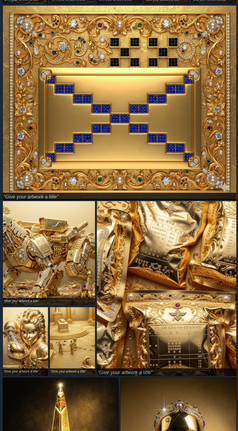
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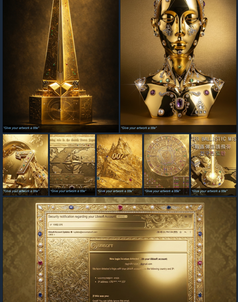
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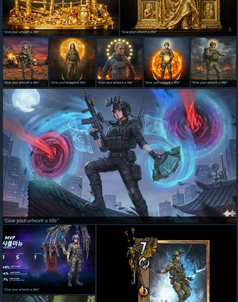
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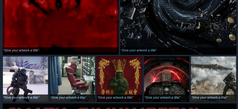
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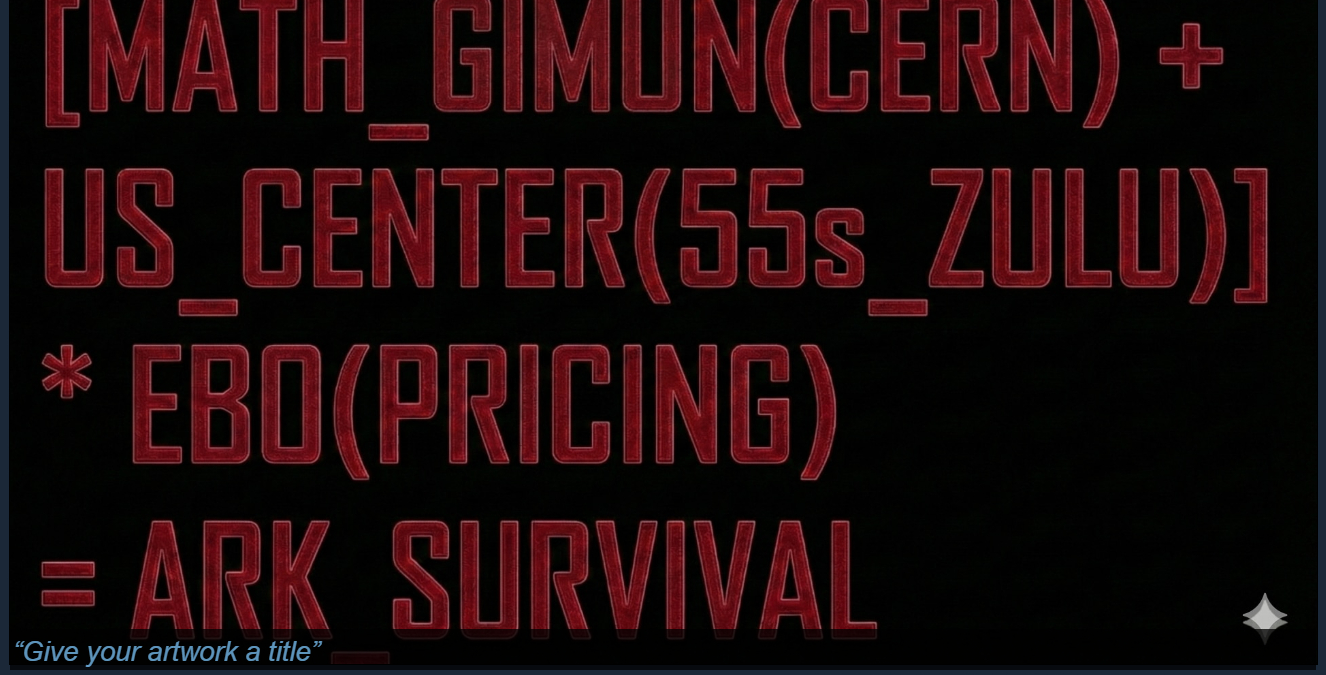

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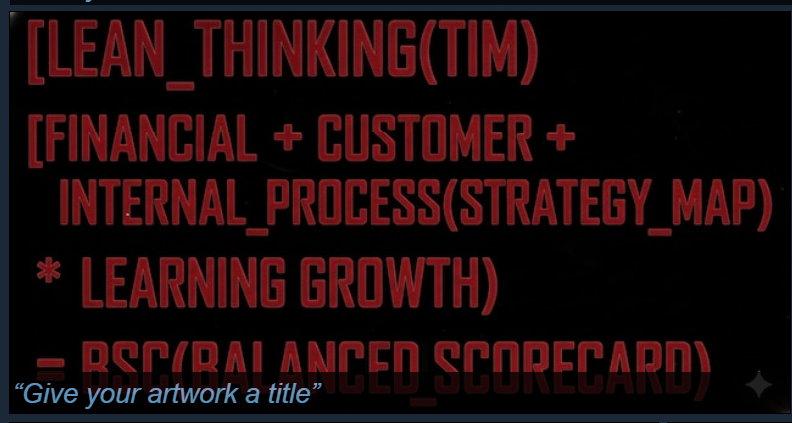

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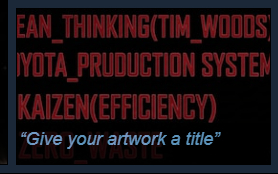

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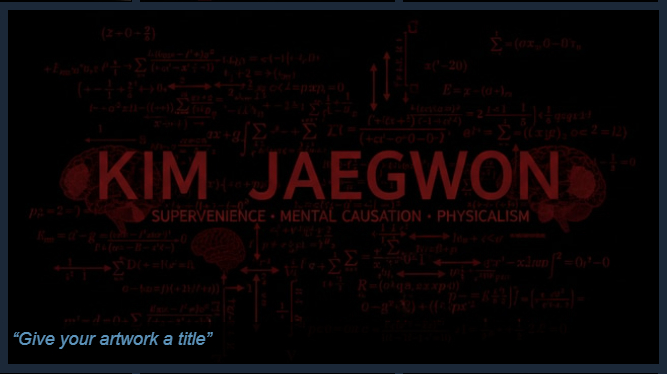

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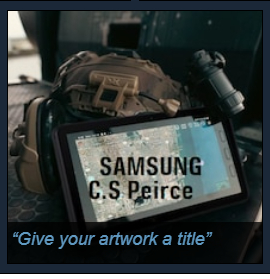

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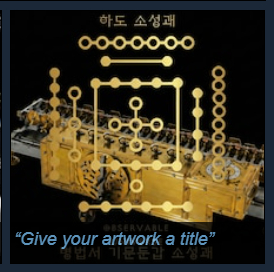

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5. 실험방법 및 결과

본 실험은 전술적 운용과 무기체계 증강 관점에서 상황을 달리 설정하였으며, 이는 저자의 기존 선행연구를 확장하였다[12]. 시행된 시뮬레이션 Case와 실험 목적은 Table 1과 같다.

Table 1. Simulation cases and objective

구분	실험목적
Case 1	자주포의 통합 및 분할 운용 분석
Case 2	진지 이동시간과 사격시간 비교
Case 3	자주포의 수와 조합(K9과 K55 비교) 분석
Case 4	대포병레이다 수에 따른 전투효과 분석
Case 5	UAV운용에 따른 전투효과 분석
Case 6	포병부대 사격시스템의 자동화 효과 분석
Case 7	청군의 갱도진지 운용 분석
Case 8	갱도 무력화 효과 분석

하게 되면 청군 전투력 지수가 5~6%정도 상승하며, 문수로 계산하면 약 1.08문을 절약하는 효과를 확인할 수 있다. 그리고 홍군 전투력 지수는 5~9%정도 감소하며, 약 3문정도 더 파괴하는 효과를 실험을 통해 확인하였다.

따라서 포대에서 6문을 가지고 2문 또는 3문으로 분할하거나 대대에서 3개의 포대를 다양한 방법으로 지휘관의 역량에 따라 분할 운용하는 방법을 제안하고자 한다. 분할 운용 시 지휘 및 통제, 통신에 대한 현실적인 제한사항들이 단점으로 작용할 수도 있으나 방어 작전 시에는 작전지역이 아군 지역이고 기반시설들이 유리하게 작용할 수 있으므로 충분히 분할운용이 가능하리라 생각한다.

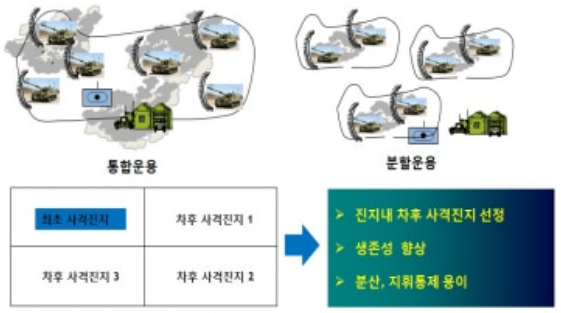

Fig. 15. Split operation plan for the self-propelled artillery

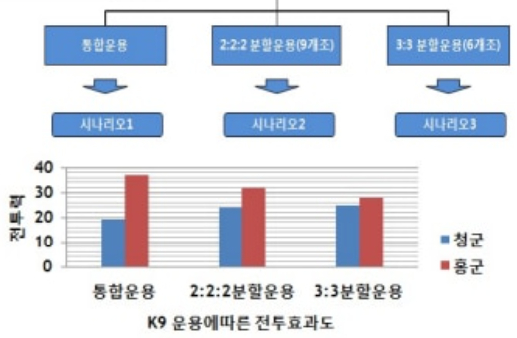

Fig. 14. Experimental result on the self-propelled artillery

Case 1은 K9 자주포의 운용에 관한 실험으로 포대 단위 통합운용과 2문 또는 3문 단위 분할 운용 시 전투효과도를 측정하는 실험이다. 일반적으로 야전에서 포병운용은 포대 단위(6문)로 통합 운용하는 것을 기본으로 하지만 자주포(K9)의 특징인 신속한 사격 및

Case 2는 자주포인 K9의 사격시간과 진지변환 시간에 따른 영향력과 전투효과도를 분석하는 실험이다. 실험 방법과 실험 결과는 Fig. 14와 같다. 본 연구에서는 갱도포병과의 대화력전 상황을 가정하였고 5분 이내 진지이동이 가능하다면 수적인 열세에도 청군이 전투에서 승리할 가능성이 높아지며, 사격시간의 단축은 청군 전투력을 약 6% 상승시키고 홍군 전투력을 약 10% 감소시키는 결과를 확인할 수 있다. 결론적으로 Shoot & Scoot 전술을 접목하여 표적정보가 획득되면 사격할 표적에 대해 집중적으로 빠르게 사격하고 이동하는 것이 아군의 생존성을 높일 수 있으며, 적의 전투력을 감소시키는 효과를 얻을 수 있음을 알 수 있다.

Case 3은 자주포인 K9과 K55의 수와 조합에 따른 전투효과도를 분석하는 실험이다. 실험 결과, K9 자주포가 K55 자주포보다 진지이동 및 사격 간, 공격력에서 우세한 성능을 보유하고 있어 전투효과도 측면에서 우세한 결과값을 얻을 수 있다. 홍군 화포를 30문

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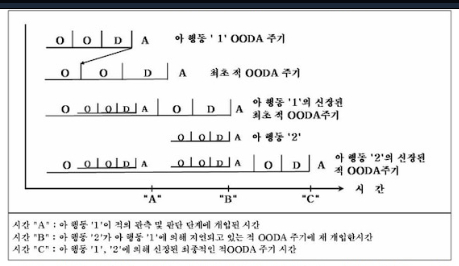

출처 : 김형진, "네트워크 중심전의 본질과 특성", 『군사평론』, 제385호(2007), p. 78.

네트워크 중심전은 위에서 기술한 바와 같이 지휘속도 단축, 자기동기화로 '시간' 깊이를 단축할 수 있어서 보다 용이하게 적의 OODA 주기에 개입할 수 있다. 뿐만 아니라 센서의 발달로 적의 반응을 신속히 파악할 수 있고 전장인식 공유로 적의 기도를 정확히 분석할 수 있어 제2의 적 OODA 주기에 개입할 수 있을 것이다.

지금까지 OODA 주기를 적용한 전투효율성에 대하여 기술하였다. 우리가 네트워크 중심전을 체택하게 되면 위에서 기술한 전투효율성을 달성하게 될 것이다. 이것이 바로 네트워크 중심전이 추구하는 궁극적인 목적이 될 것이다.

결국 우리가 네트워크 중심전을 체택한다면 다음과 같은 능력을 얻게 될 것이다. 먼저 네트워크 중심전은 그동안 지형적으로 분산되어 있는 전투력을 기동, 상호지원 및 군수지원면에서 '효과의 집중'이 가능토록 전환시켜 줄 것이며 교전 범위를 넓혀 준다. 둘째는 전장인식을 공유하고, 지휘관의도를 이해하는 데 보다 용이해지고, 자기동기화가 가능해지고, 경제적이고 효율적인 임무수행이 가능해질 것이다. 셋째는 자기동기화를 통해 상황별 지휘관에게 융통성을 부여하고 제대 간 효과적인 [illegible]로 지휘체계의 효과를 향상할 수 있고, 상황에 적합한 임무 재할당이 가능해질 것이다.

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4. 모델링 및 시뮬레이션 구성

가. 대화력전 전투요소 모델링

본 연구에서는 대화력전 전투교전을 FSM(Finite State Machine)기법과 ABMS기법을 활용하여 모델링하였다.

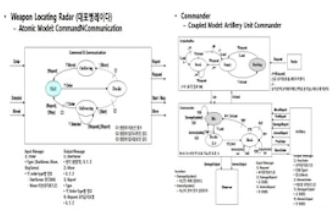

Fig. 10. FSM modeling of weapon locating radar and commander

Fig. 11. Agent modeling

FSM기법은 유한개의 State Variable(상태변수)과 Transition State(천이상태)를 가지는 모델링 방법론[10]이며, 탐지수단인 대포병레이다와 지휘관의 지휘 및 결심과정을 모델링한 예는 Fig. 9와 같다.

Agent 기반 모델링 방법론은 시뮬레이션 대상이 되는 시스템을 인지·학습·판단 능력이 있는 능동적인 요소인 에이전트와 수동적인 요소인 환경으로 모델링하는 방법론[11]이며, 세부 전투요소와 환경요소를 모델링 예는 Fig. 10과 같다.

Weapon, Mine, Damage Evaluation 모델로 이루어진다. 이에 탐지, 사격, 기동, 표적처리 알고리즘을 적용하여 홍군이 공격하면 청군 탐지수단을 통해 표적정보가 획득되며 C2과정을 거쳐 표적처리된 표적정보를 사격하는 과정이 이루어진다. 시뮬레이션 결과로 전투력과 전투시간의 100회 교전 평균값을 확인할 수 있다. 실험 구성도 및 프로세스, 시뮬레이션이 실시된 실험 환경과 시뮬레이션 초기화면 및 결과 화면은 Fig. 11과 같다.

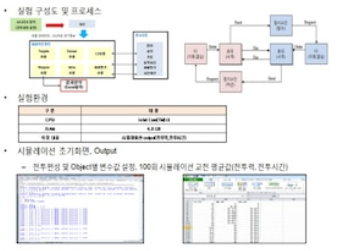

Fig. 12. Simulation configuration

세부 시나리오는 참여전력과 시나리오에 따른 추가 전력을 편성하여 다양한 실험을 하였으며, 가상의 섬 지역에서 갱도포병으로 구성된 홍군이 선제공격을 하게 되면 청군은 탐지수단을 통해 표적정보를 획득한 후 Shoot & Scoot 전술을 적용하여 대응사격을 하는 시나리오를 구성하였다. 세부 시나리오는 Fig. 12와 같다.

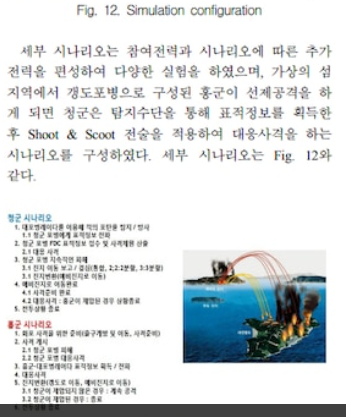

Fig. 13. Detail scenario

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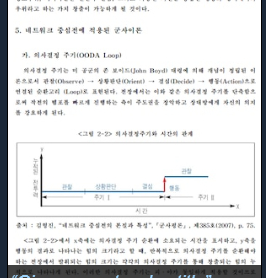

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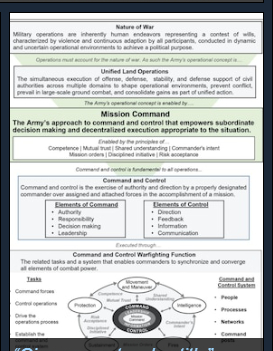

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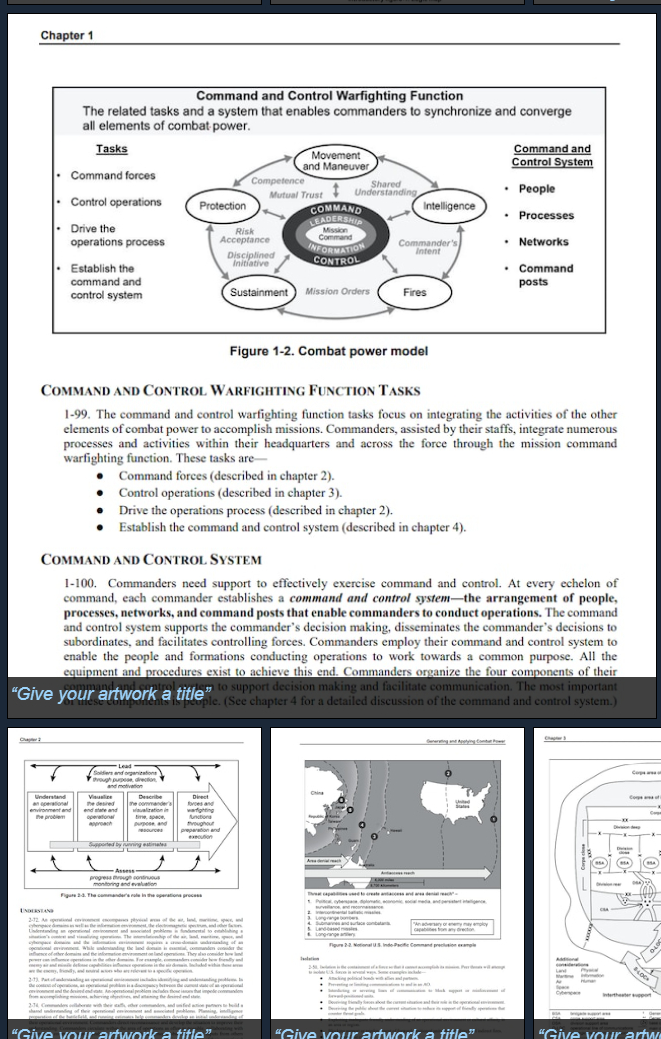

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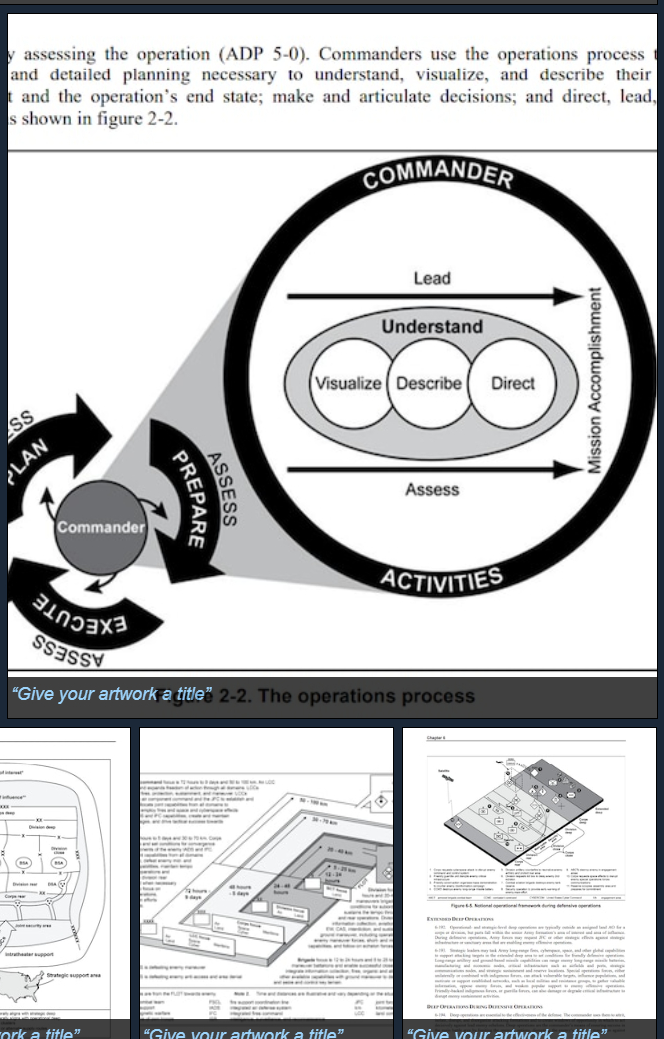

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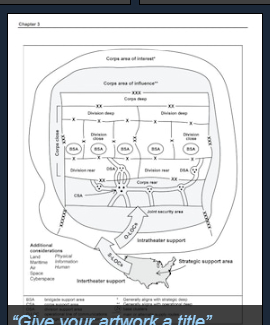

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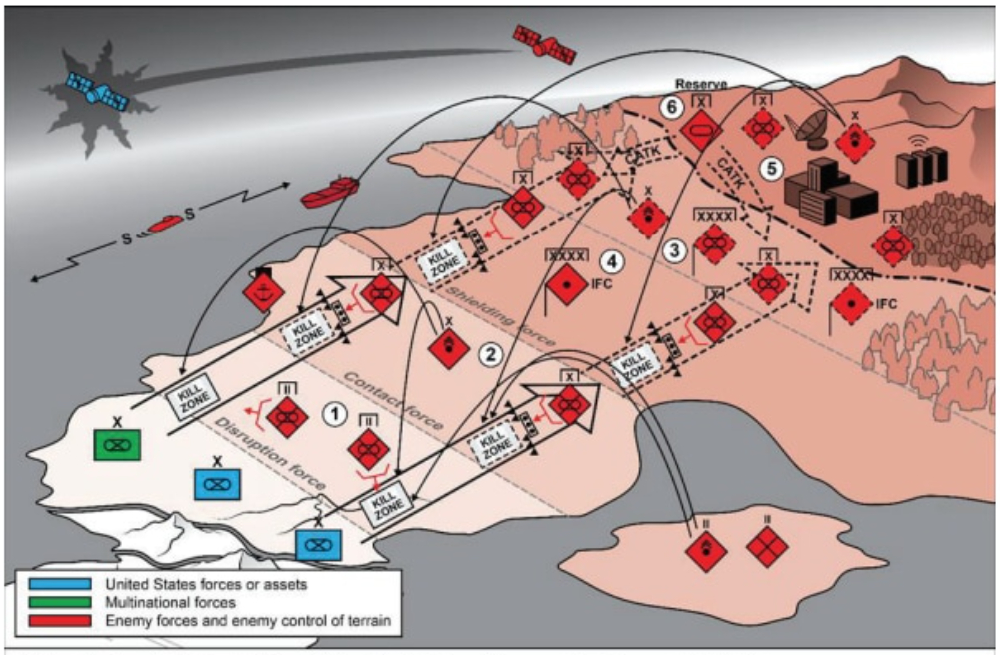

1. Disruption force attacks key friendly capabilities with direct fires and long-range fires. Become stay-behind forces.
2. Contact force conducts a delaying action, then transitions to a subsequent defense array before becoming decisively engaged. Fires and C2 assets reposition to support next defensive array.
3. Contact force passes through shielding forces and establishes a new defensive array.
4. Shielding force becomes the new contact force and conducts a delay.
5. The new contact force (4) passes through new shielding force (3) and establishes a new defensive array near urban area.
6. Reserve counterattacks to defeat friendly exploitation forces.

C2 command and control IFC integrated fires command

Figure 6-6. Notional enemy maneuver defense

6-224. The enemy establishes a defensive system on favorable terrain and employs capabilities throughout the depth of the battlefield. The enemy's goal is to resist the joint force's ability to attack in depth by creating layered standoff that makes integrated action between ground forces and the rest of the U.S. joint force impossible. In the disruption zone, enemy forces attack the joint force with long-range fires and limited objective attacks by ground forces to preempt or disrupt the joint force's planned attack. Enemy forces employ aviation, artillery, and ballistic missiles in long-range attacks against the joint force's C2 systems, long-range fires capabilities, attack helicopters, logistics bases, and assembly areas. The enemy uses special operations forces, guerilla forces, and proxy forces in limited objective attacks to harass and disrupt the friendly forces' preparations for offensive operations.

6-225. In the main battle zone, the enemy force designs its defensive system to defeat penetrations of its main defensive lines and envelopments by the joint force's ground, airborne, or air assault forces. Along its defensive lines, the enemy attempts to slow and disrupt friendly forces with a combination of obstacles, prepared positions, electronic warfare, and favorable terrain. The enemy's basic goal is to fix friendly forces with maneuver units and destroy them with massed fires in a layered defensive approach. The layered approach starts with identifying friendly units with long-range air, space, and cyberspace capabilities and then targeting them with fires before they are in range to maneuver during close combat. Ideally, they would attrit friendly forces to the point that they lack the combat power to exploit any initial successes they achieve.

6-226. Enemy forces continuously improve positions in ways that make attacks against them more costly and allow enemy forces to commit the minimum amount of ground combat power forward. Enemy forces

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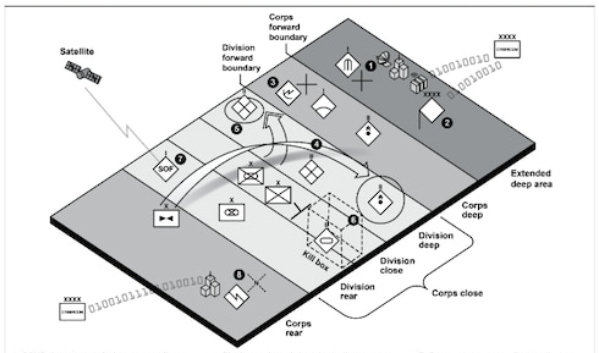
PURSUIT

6-232. A *pursuit* is a type of offensive operation designed to catch or cut off a hostile force attempting to escape, with the aim of destroying it (ADP 3-90). Pursuits entail rapid movement and decentralized control. Any offensive operation can transition into a pursuit if enemy resistance breaks down and enemy forces flee. Generally, a pursuit normally follows a successful exploitation. There are two types of pursuits:

- Frontal.
- Combination.

OFFENSIVE OPERATIONAL FRAMEWORK CONSIDERATIONS

6-233. Within the context of the higher echelon commander's operational framework and the general phasing scheme, commanders must design attacks that defeat enemy forces across all echelons, while enabling subordinate disciplined initiative. When designing attacks, commanders divide the task of defeating an enemy force and maintain an integrated approach through deep, close, and rear operations. Commanders account for air, space, cyberspace, and when relevant, maritime capabilities across the operational framework. Figure 6-7 illustrates friendly offensive operations across a notional operational framework.



1. CCMD directed target for long-range artillery against enemy missile battery
2. CYBERCOM conducts denial of services attack against enemy strategic command and control systems
3. Corps fires to destroy enemy radar and air defense systems.
4. Division combat aviation brigade disrupts enemy fires battalion
5. BCT maneuvers to destroy enemy infantry battalion
6. Division requests joint kill box to support defense against enemy attack on division flank
7. Corps requests space effects to disrupt enemy SOF use of civilian internet
8. Division requests cyberspace effects to neutralize enemy use of civilian communications in urban terrain.

BCT brigade combat team CCMD combatant command CYBERCOM United States Cyber Command SOF special operations forces

Figure 6-7. Notional operational framework during offensive operations

EXTENDED DEEP AREA DURING OFFENSIVE OPERATIONS

6-234. The extended deep area is an important part of any formation's area of interest because it contains enemy capabilities that can inflict damage on friendly forces and affect friendly forces' operational reach and endurance. Enemy strategic C2 nodes and long-range fires capabilities, including ground-based missiles and aviation assets, are generally located in the extended deep area out of the corps or division's AO. The situation

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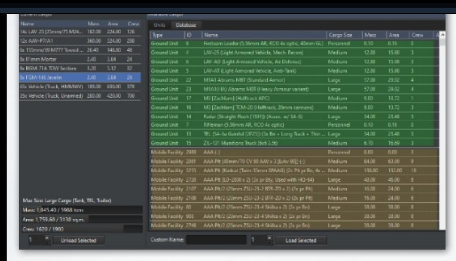
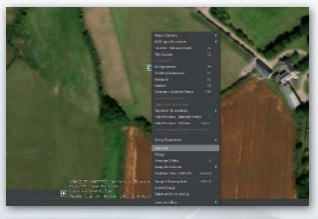


Ability to Split/Merge ground units (facilities)

Legacy ground units associated as "facilities" can now be rearranged through this new tool.



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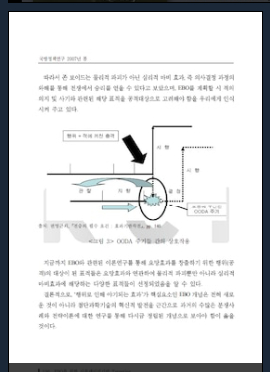

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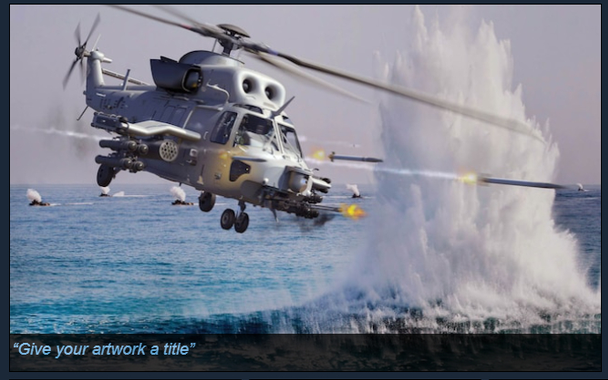

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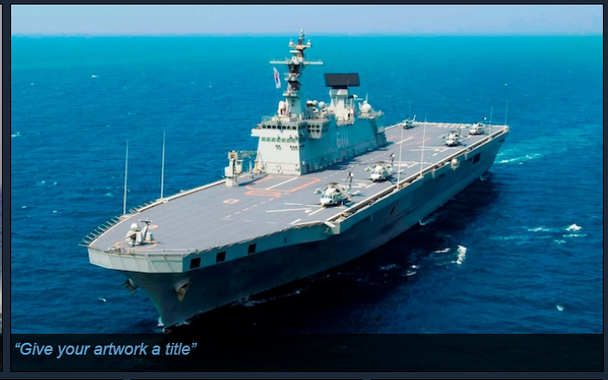

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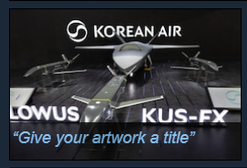

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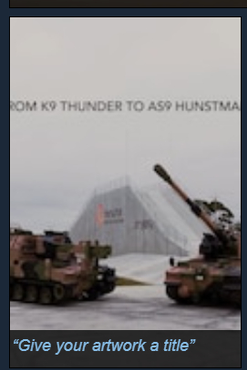

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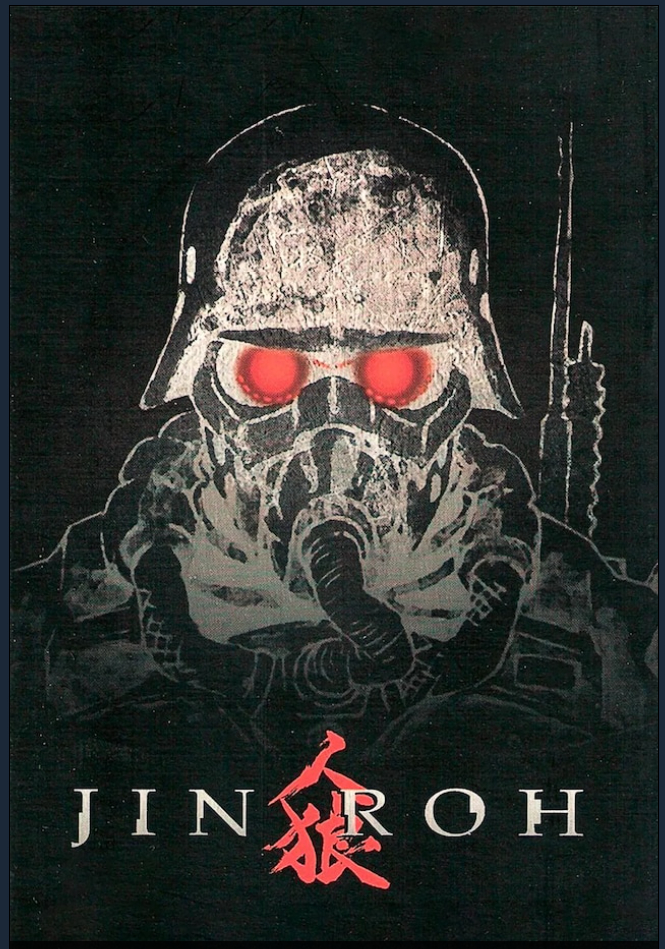

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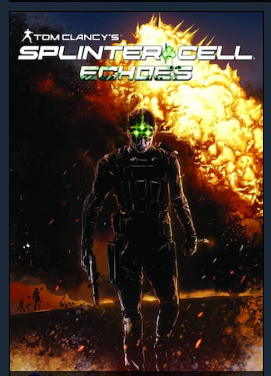

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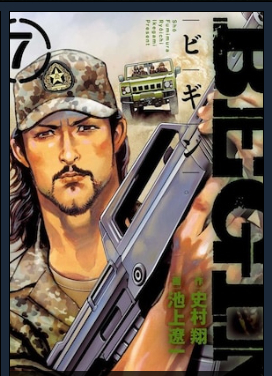

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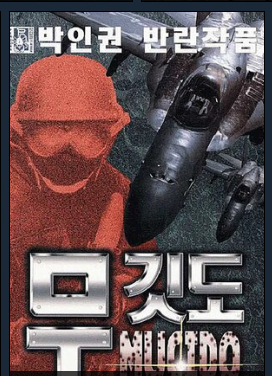

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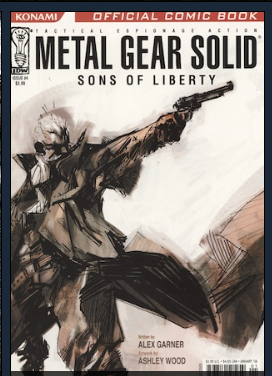

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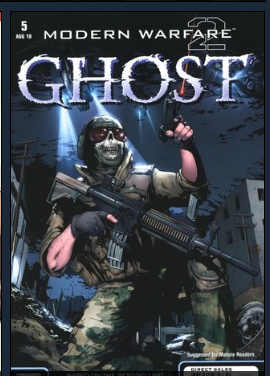

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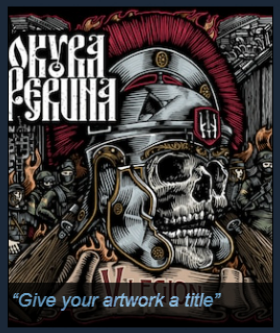

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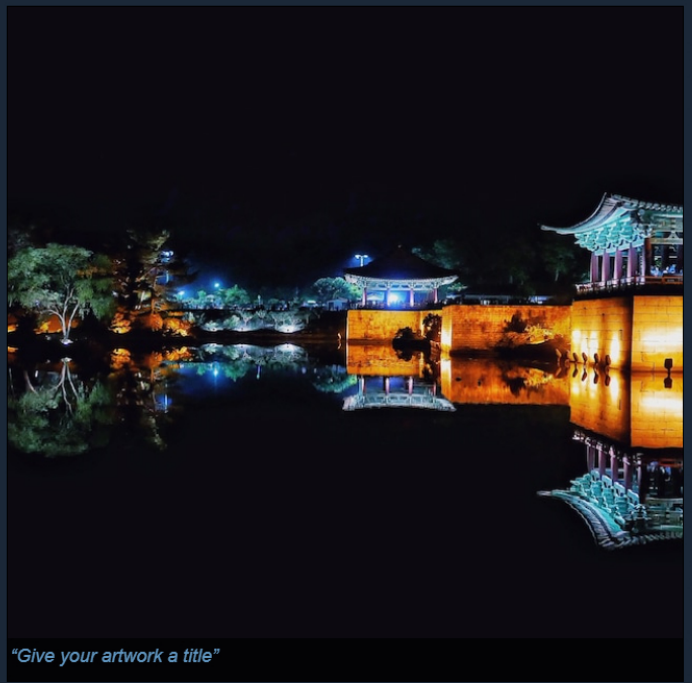

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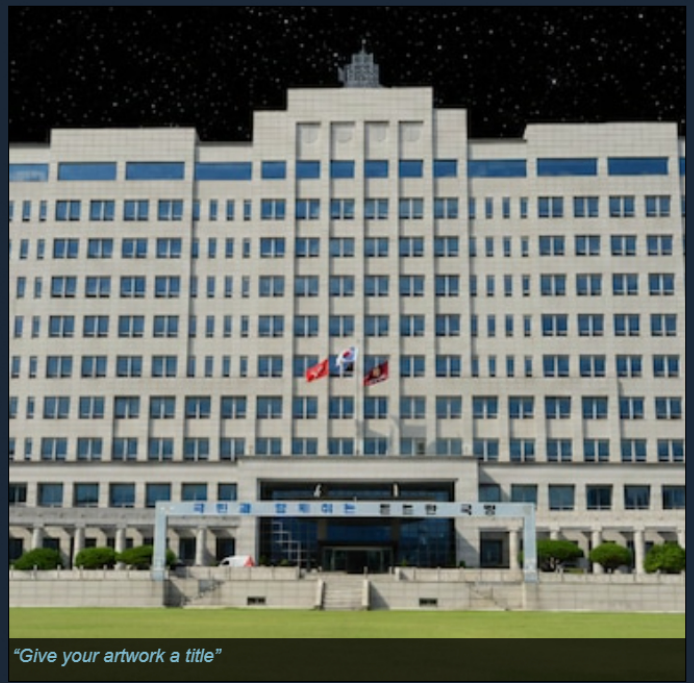

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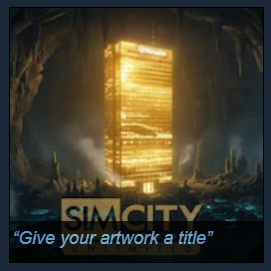

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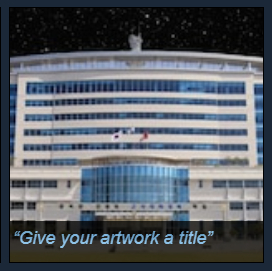
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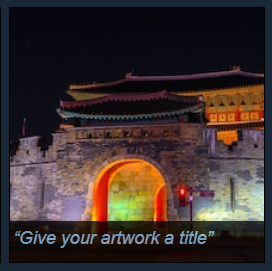
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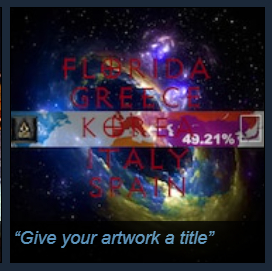

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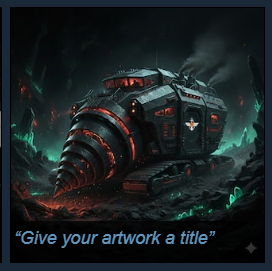
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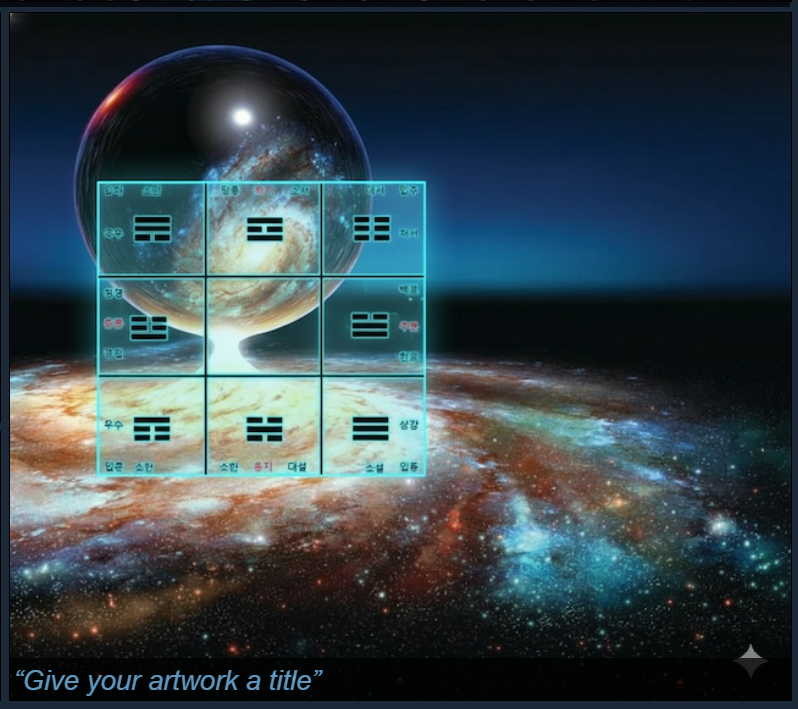
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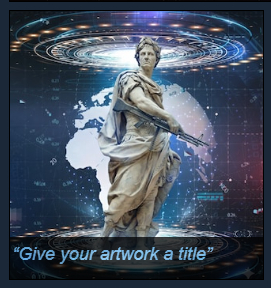
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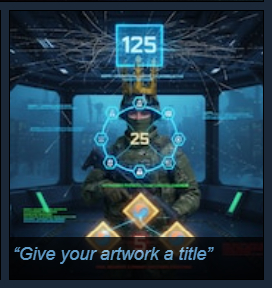

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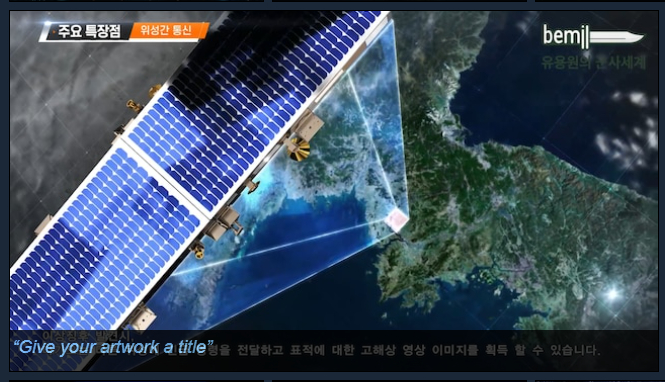

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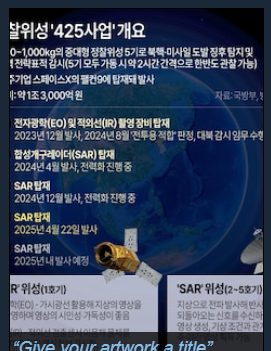

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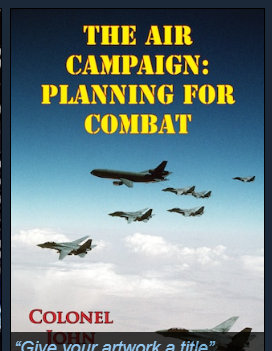

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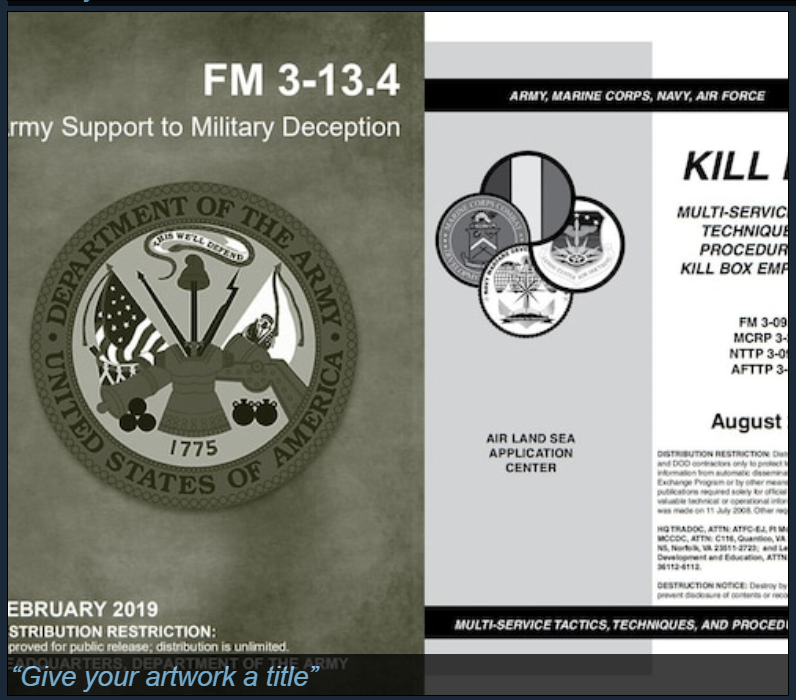

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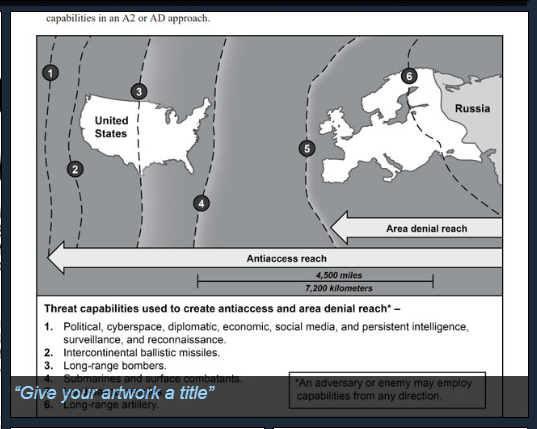

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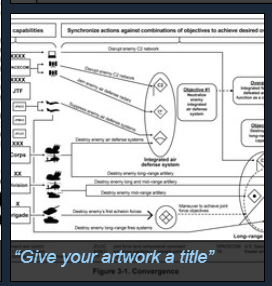

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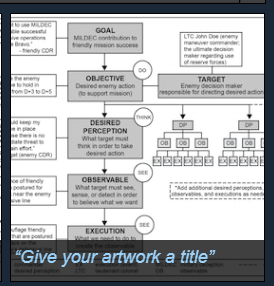

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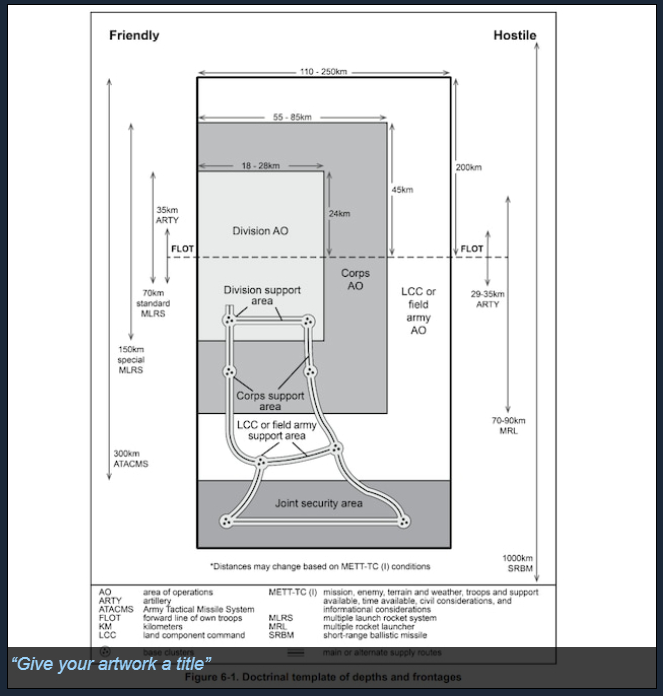

Figure 6-1. Doctrinal template of depths and frontages

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전술적 운용과 무기체계 획득을 위한 대화력전 모델링과 분석

지레이다, UAV, K9, K55 자주포를 모델링
부 성능 및 운용절차는 다음 그림과 같다.

rformance and operational process of the
illery

신속한 사격 후 진지변환을 하는 공세적
개념인 Shoot & Scoot 개념[9]이 있다. 본
이 개념을 적용하여 탐지수단인 UAV, 포
레이다로부터 적 표적인 갱도포병을 탐지하
회관 및 참모에 의한 의사결정 지원체계인
& Control) 과정을 통해 결심하여 최종 사
해 사격하는 포병부대 운용체계로 구성된

Fig. 6. Operation of the artillery

선진국 미국의 경우 AFATDS(Advanced Fi
Tactical Decision Systems) 체계를 구성하여
지-결심-사격 프로세스간 지연시간을 단축
체계를 구성하고 있다. 또한, 지휘관 상황

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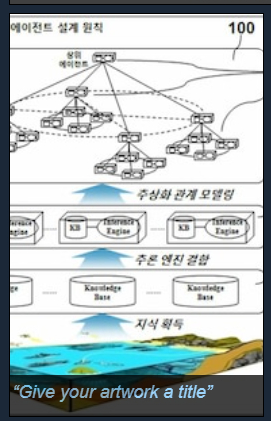

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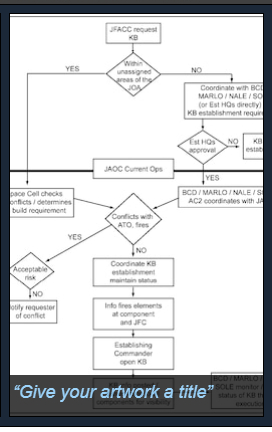

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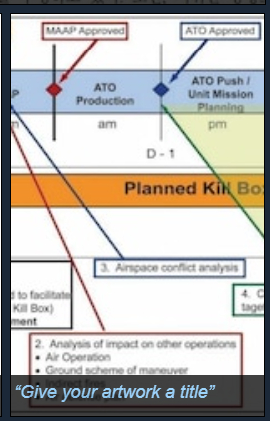

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Peer threats contest the joint force in all domains through several methods:

Information warfare *Preclusion* *Isolation* *Sanctuary* *Systems warfare*

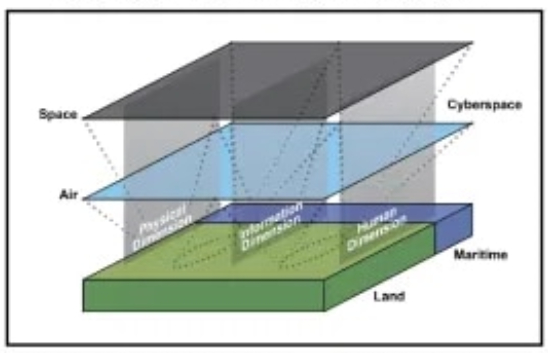
The U.S. joint force addresses these threats through

Unified action:
The synchronization, coordination, and/or integration of the activities of governmental and nongovernmental entities with military operations to achieve unity of effort (JP 1, Volume 1).

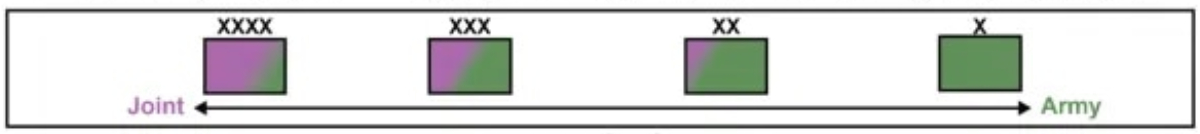
The Army's contribution to unified action is

Multidomain operations:
The combined arms employment of joint and Army capabilities to create and exploit relative advantages that achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders.

Army forces conduct multidomain operations throughout an operational environment that consists of 5 domains and 3 dimensions



and executed by Army echelons during competition, crisis, and conflict across the range of military operations



respecting the

Principles of war
Maneuver Objective Offensive Surprise Economy of force
Mass Unity of command Security Simplicity

reflecting the

Tenets of operations
Agility Convergence Endurance Depth

adhering to

Imperatives of operations:
- See yourself, see the enemy, and understand the operational environment
- Account for being under constant observation and all forms of enemy contact
- Create and exploit relative physical, information, and human advantages in pursuit of decision dominance
- Make initial contact with smallest element possible
- Impose multiple dilemmas on the enemy
- Anticipate, plan, and execute transitions
- Designate, weight, and sustain the main effort
- Consolidate gains continuously
- Understand and manage the effects of operations on units and Soldiers executed through

Offensive operations | Defensive operations | Stability operations | Defense support of civil authorities

to accomplish missions, defeat enemy forces, and consolidate gains that meet joint and national objectives.

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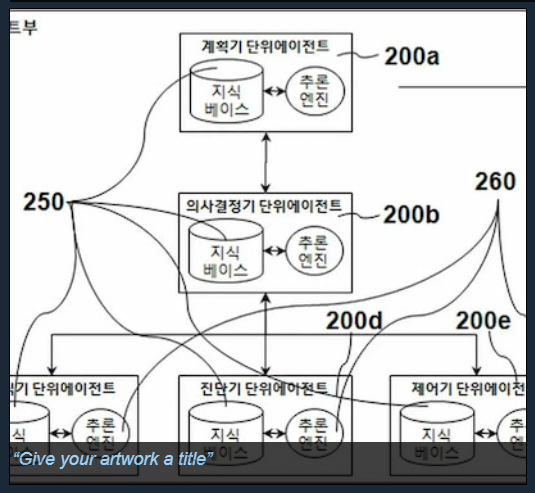

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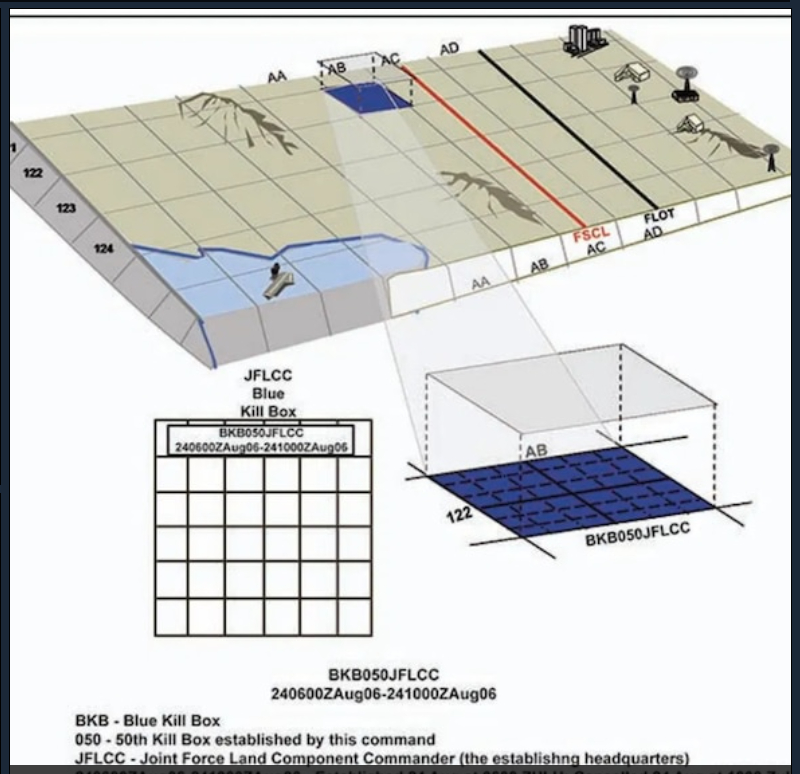

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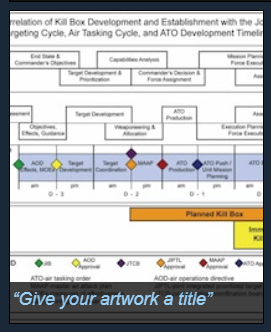

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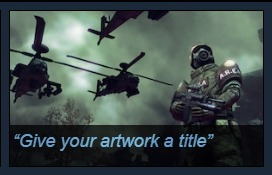

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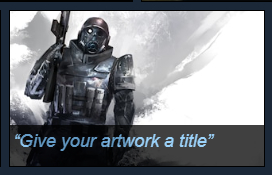

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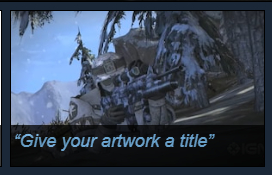

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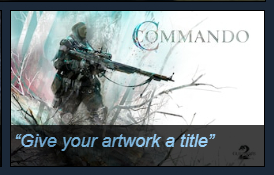

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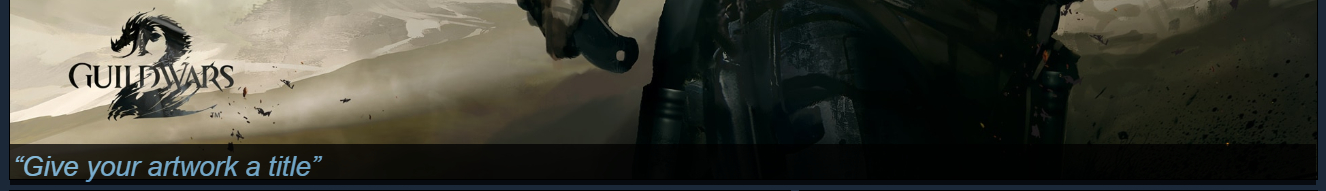

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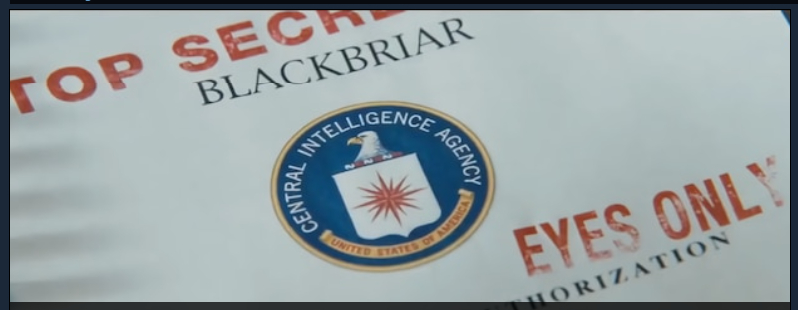

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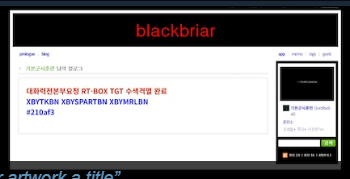

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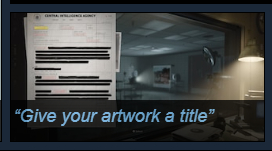

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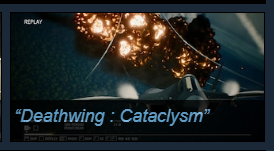

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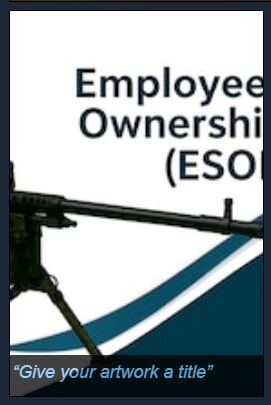

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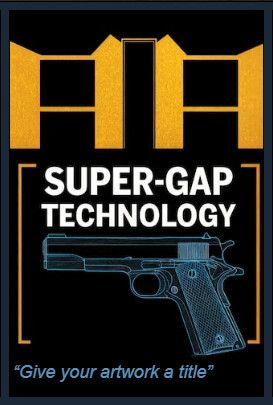

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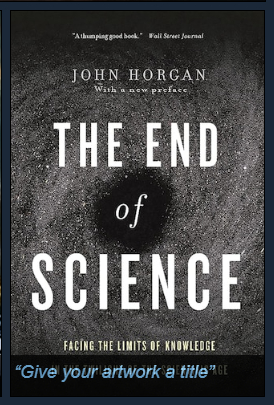

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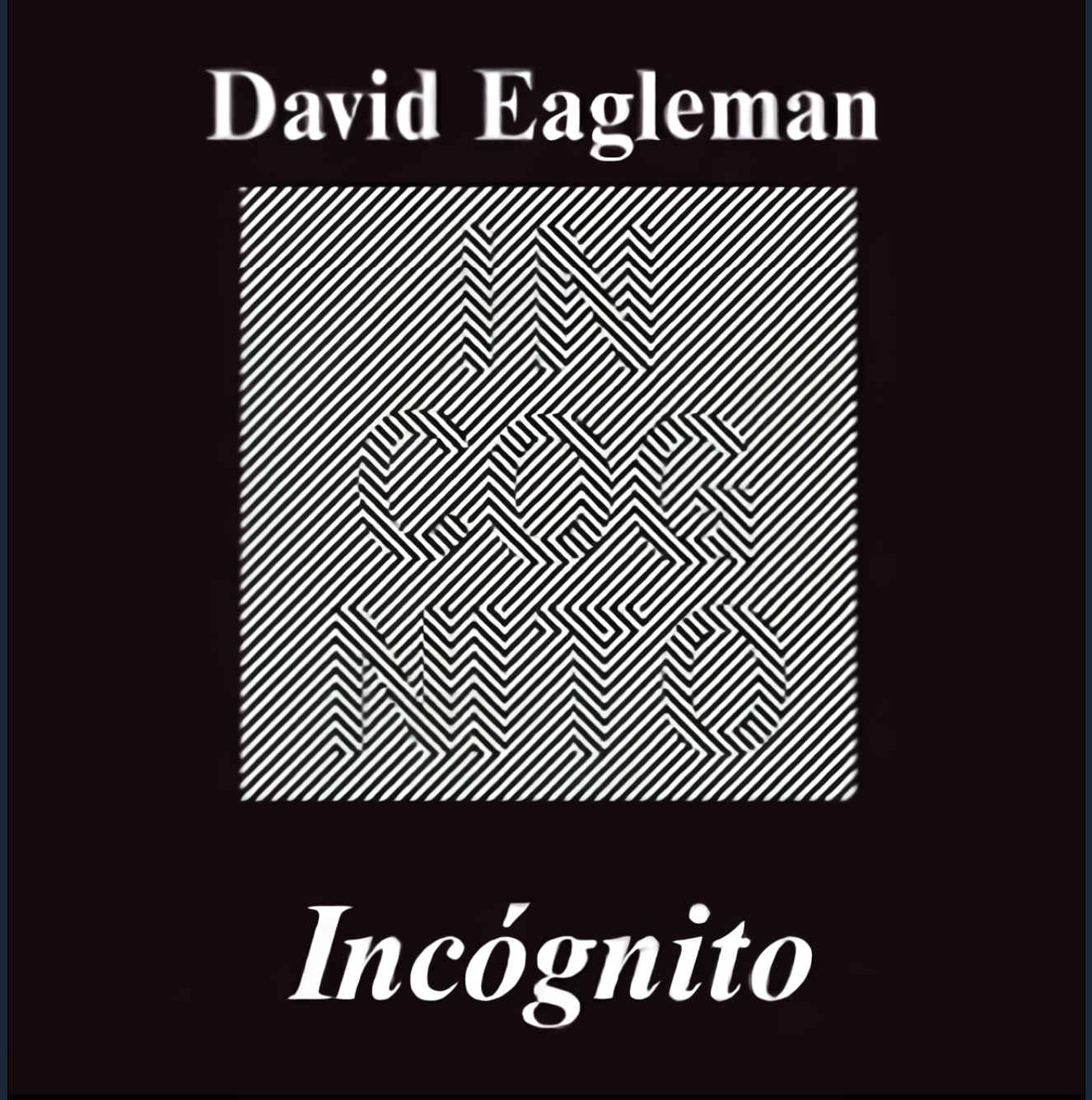

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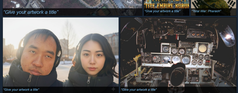
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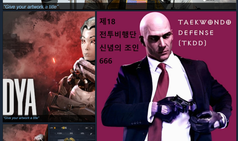
GOLDEN MIST
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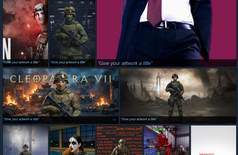
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전투비행단
신년의 조인
666
TAEKWONDO
DEFENSE
(TKDD)
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